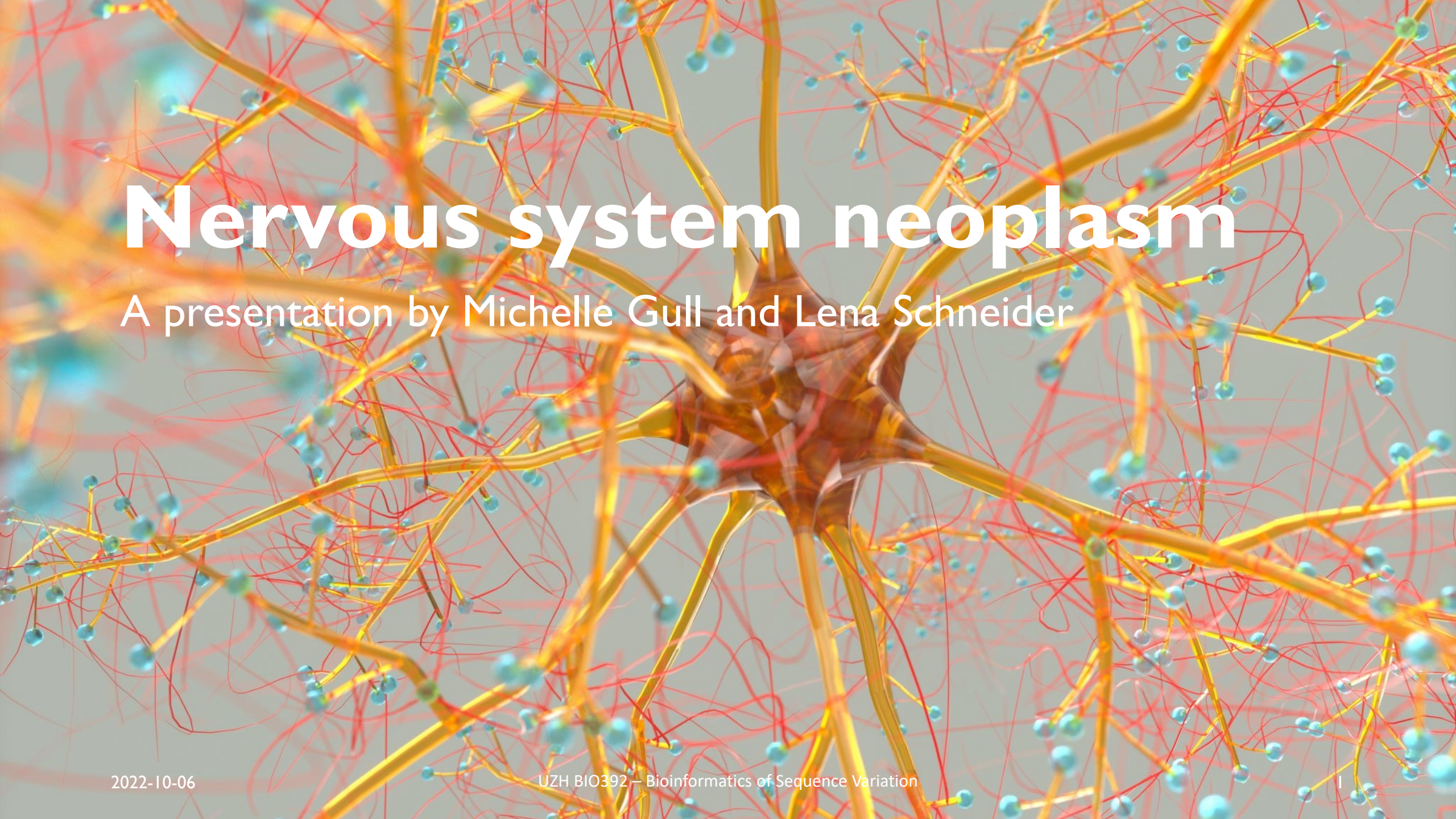


Nervous system neoplasm

A presentation by Michelle Gull and Lena Schneider

Introduction

- Many different tumour types can affect the nervous system
- Develop in the brain and spinal cord
- Symptoms vary depending on location and size
- Can be benign / malignant
- A CNS tumor is especially problematic because a person's thought processes and movements may be affected
- CNVs are often age and region specific

WHO Classification of Tumors of the Nervous System

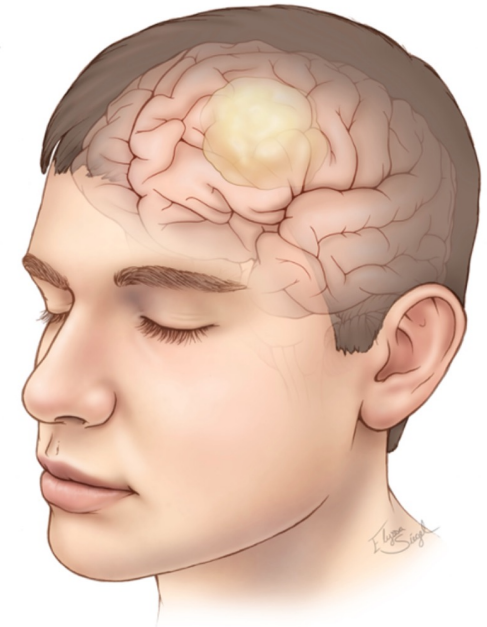
- **Tumors of Neuroepithelial Tissue**
  - Astrocytic Tumors
    - Diffuse astrocytoma; Anaplastic astrocytoma; Glioblastoma; Pilocytic astrocytoma; Pleomorphix xanthoastrocytoma; Subependymal giant cell astrocytoma
  - Oligodendroglial Tumors
    - Oligodendroglioma; Anaplastic oligodendroglioma
  - Mixed gliomas
    - Oligoastrocytoma; Anaplastic oligodendrogliomas
  - Ependymal tumors
    - Ependymoma; Anaplastic ependymoma; Myxopapillary ependymoma; Subependymoma
  - Choroid plexus tumors
    - Choroid plexus papilloma; Choroid plexus carcinoma
  - Glial tumors of uncertain origin
    - Astroblastoma; Gliomatosis cerebri; Chordoid glioma of the 3rd ventricle
  - Neuronal and mixed neuronal-glial tumors
    - Gangliocytoma; Dysplastic gangliocytoma of cerebellum; Desmoplastic infantile astrocytoma/ganglioglioma; Dysembryoplastic neuroepithelial tumor; Ganglioglioma; Anaplastic ganglioglioma; Central neurocytoma; Cerebellar liponeurocytoma; Paraganglioma of the filum terminale
  - Neuroblastic tumors
    - Olfactory neuroblastoma; Olfactory neruoepithelioma; Neuroblastomas of the adrenal gland and sympathetic nervous system
  - Pineal parenchymal tumors
    - Pineocytoma; Pineoblastoma; Pineal parenchymal tumor of intermediate. differentiation
  - Embryonal tumors
    - Medulloepithelioma; Ependymoblastoma; Medulloblastoma; Supratentorial primitive neuroectodermal tumor (PNET); Atypical Teratoid/Rhabdoid Tumors

WHO Classification of Tumors of the Nervous System

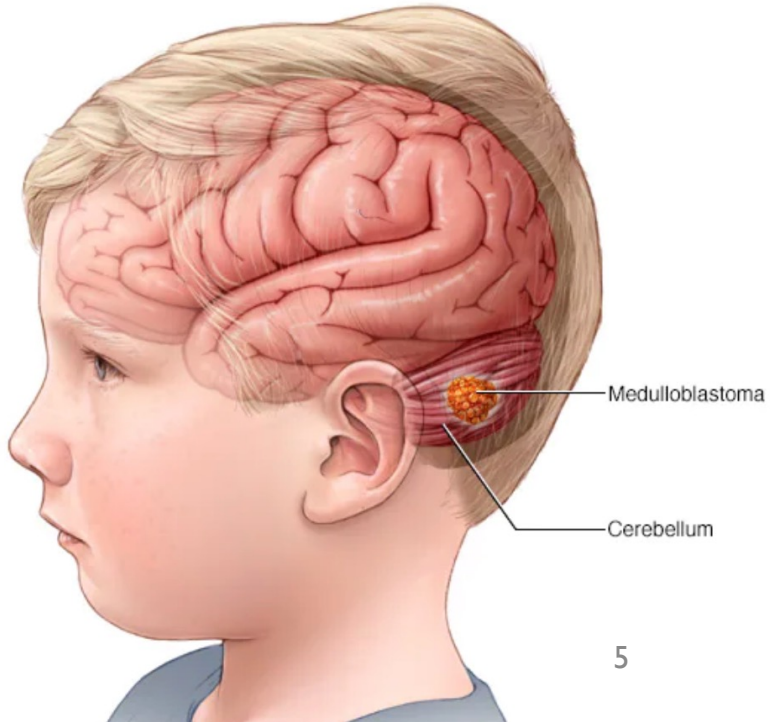
- **Tumors of Peripheral Nerves**
  - Schwannoma
    - Neurilemmoma, Neurinoma
  - Neurofibroma
  - Perineurioma
    - Intraneural Perineurioma; Soft Tissue Perineurioma
  - Malignant peripheral nerve sheath tumor (MPNST)
- **Tumors of the Meninges**
  - Tumors of meningothelial cells
    - Meningiomas
  - Mesenchymal, non-meningothelial tumors
    - Lipoma; Angiolipoma; Hibernoma; Liposarcoma (intracranial); Solitary fibrous tumor; Fibrosarcoma; Malignant fibrous histiocytoma; Leiomyoma; Leiomyosarcoma; Rhabdomyoma; Rhabdomyosarcoma; Chondroma; Chondrosarcoma; Osteoma; Osteosarcoma; Osteochondroma; Hemangioma; Epithelioid hemangioendothelioma; Hemangiopericytoma; Angiosarcoma; Kaposi sarcoma
  - Primary melanocytic lesions
    - Diffuse melanocytosis; Melanocytoma; Malignant melanoma; Meningeal melanomatosis
  - Tumors of uncertain histogenesis
    - Hemangioblastoma

Common brain tumors

- **Glioblastoma**
  - most malignant and invasive type of astrocytoma
  - cure is often not possible
  - most common form of primary brain tumor among adults
  - symptoms include headaches, nausea and seizures



- **Medulloblastoma**
  - starts in the cerebellum
  - can occur at any age, but mostly in young children
  - most common cancerous brain tumor in children
  - symptoms include headaches, nausea and poor coordination

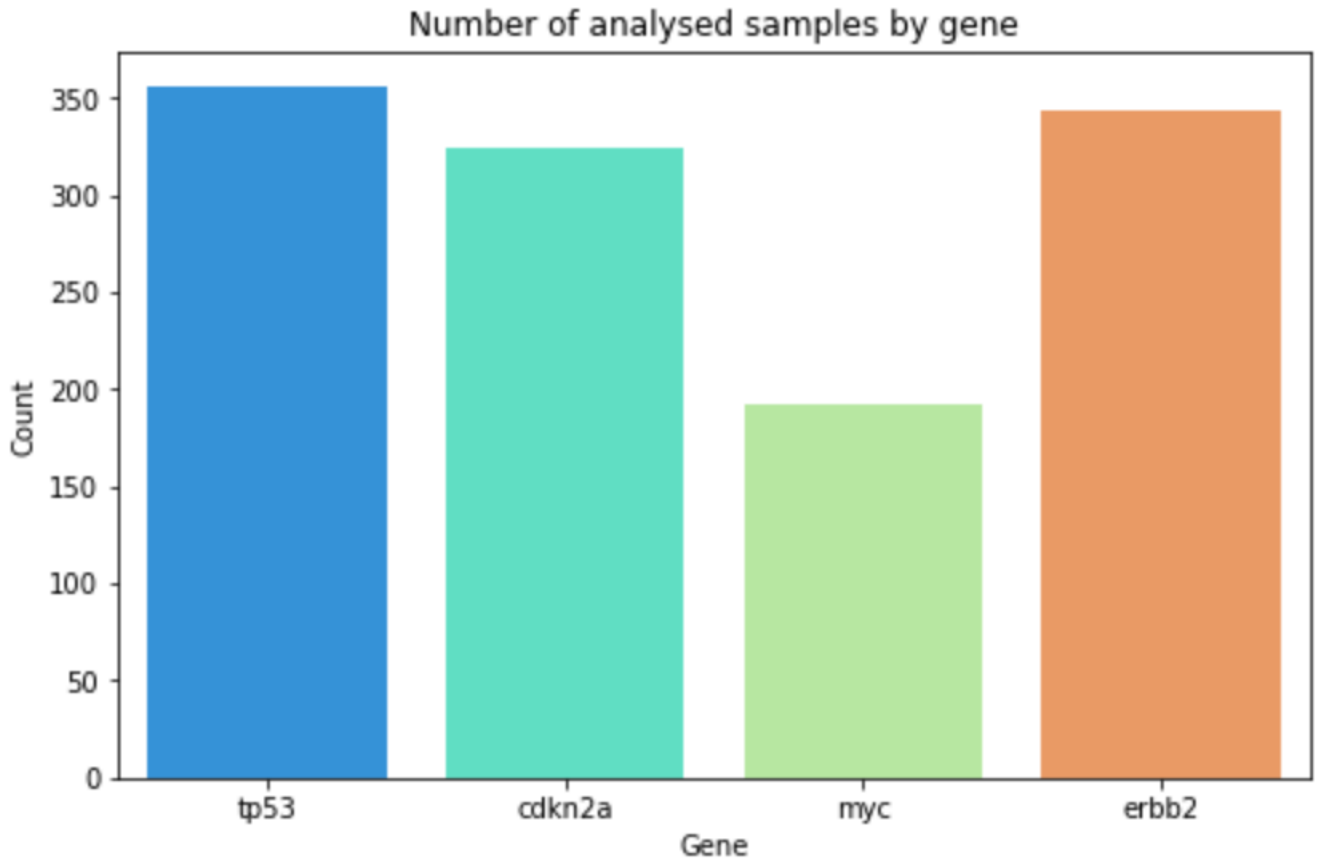


Our data

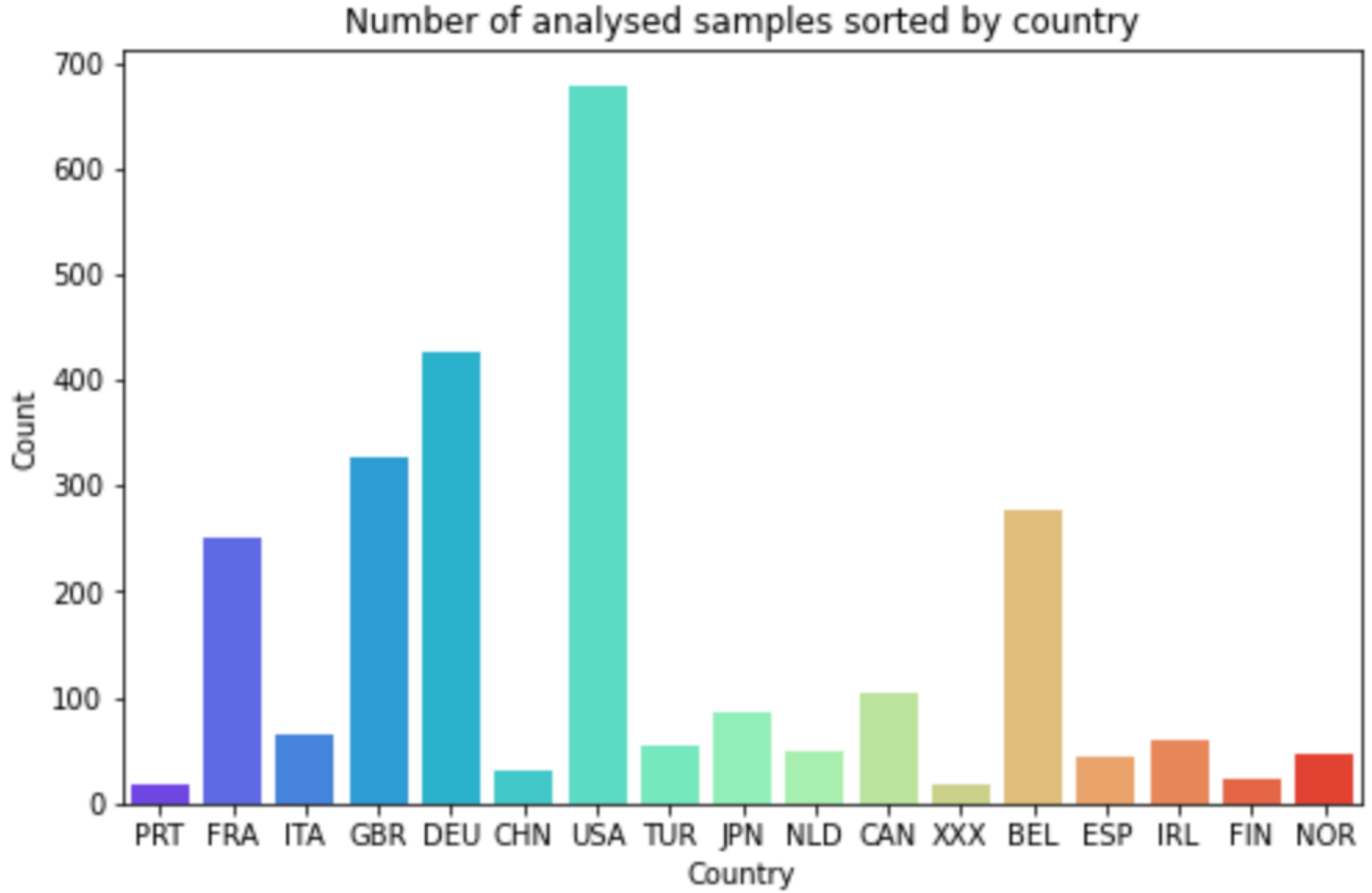
- 2560 samples
- 1379 samples with CNVs in 4 genes
- 26 tumor types
- From all age groups

Glioblastoma	706
Neuroblastoma	521
Medulloblastoma	424
Ependymoma	164
Desmoplastic/Nodular Medulloblastoma	97
Large Cell Medulloblastoma	74
Primitive Neuroectodermal Tumor	61
Astrocytoma	56
Malignant Glioma	52
Central Nervous System Embryonal Tumor, Not Otherwise Specified	52
Mixed Glioma	48
Retinoblastoma	46
Malignant Peripheral Nerve Sheath Tumor	46
Oligodendroglioma	35
Atypical Choroid Plexus Papilloma	32
Anaplastic Ependymoma	30
Gliomatosis Cerebri	23
Myxopapillary Ependymoma	18
Atypical Teratoid/Rhabdoid Tumor	13
Choroid Plexus Carcinoma	13
Gliosarcoma	12
Olfactory Neuroblastoma	12
Pineoblastoma	10
Ganglioneuroblastoma	7
Pleomorphic Xanthoastrocytoma	4
Fibrillary Astrocytoma	4

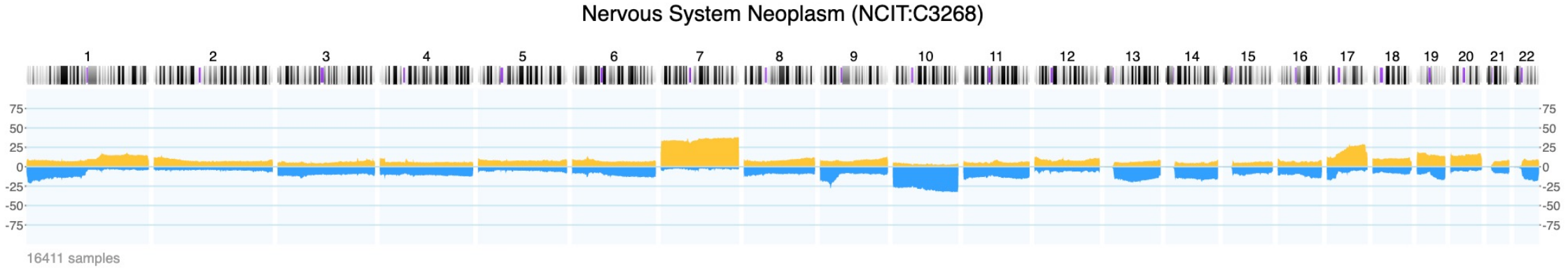
Analysed Genes



Locations of our samples

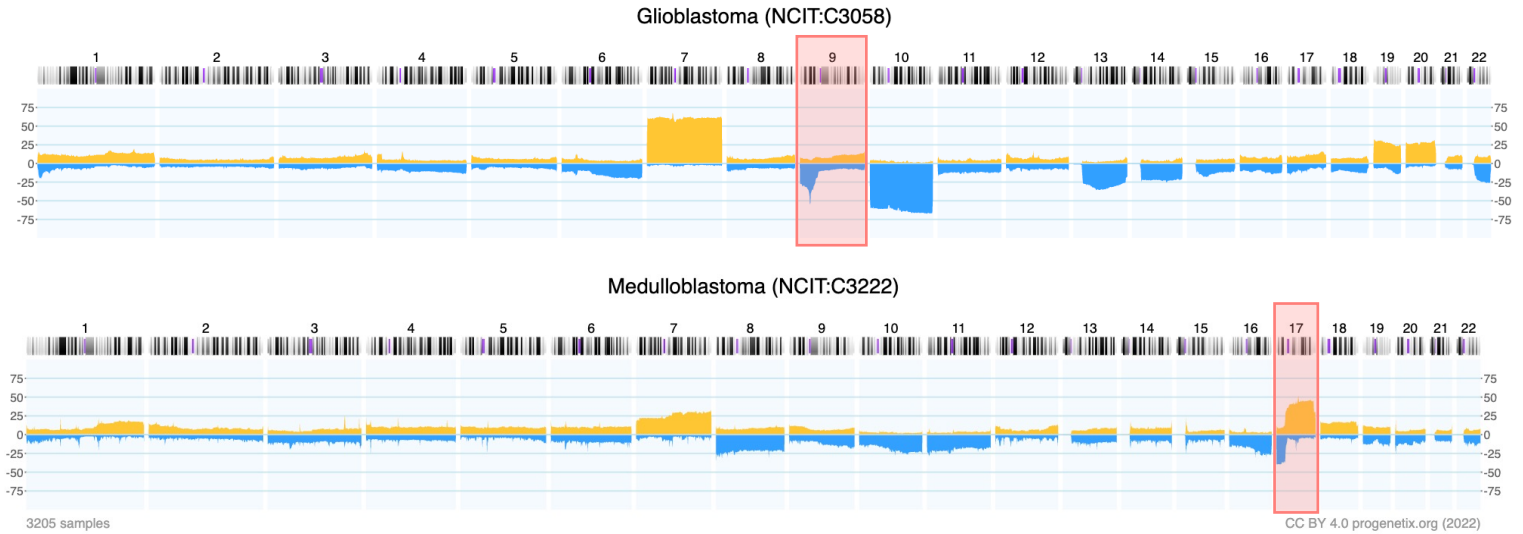


Progenetix
Search Samples of Nervous System Neoplasm

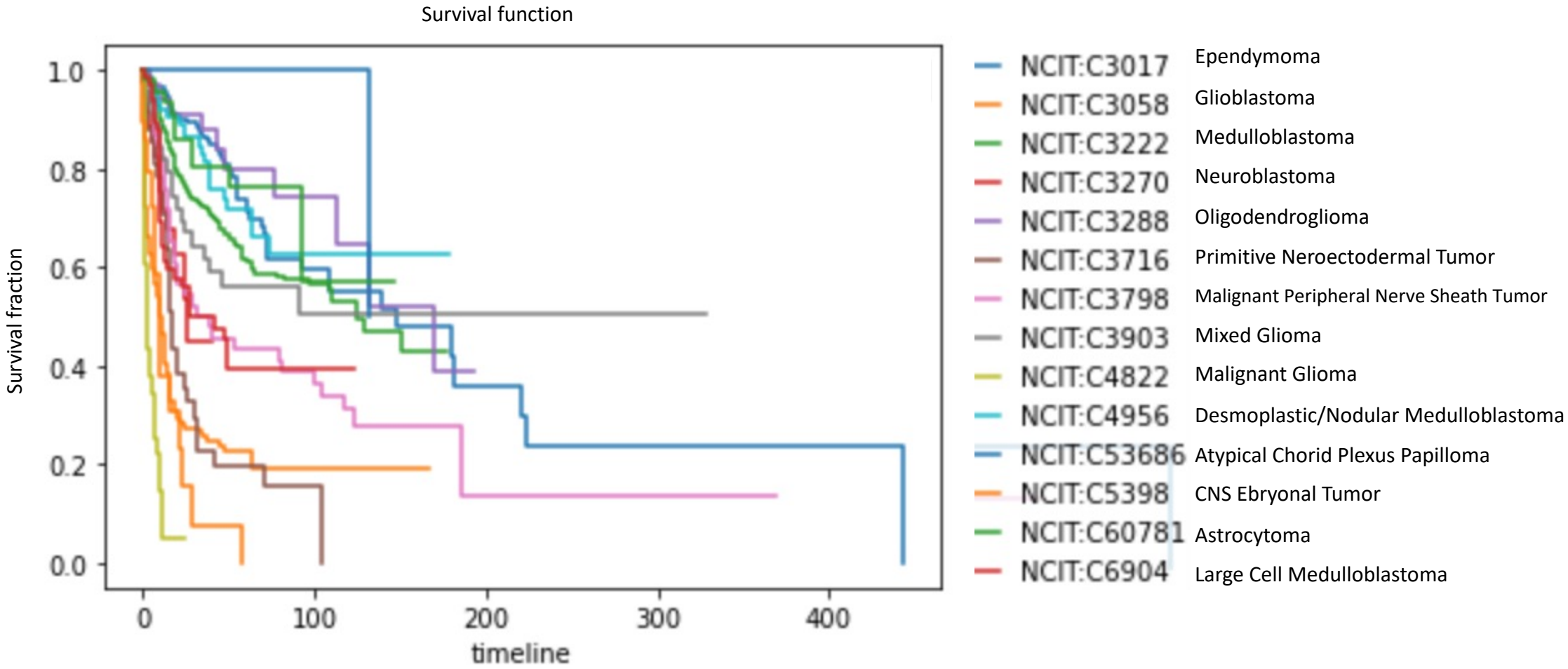


Gene Locations

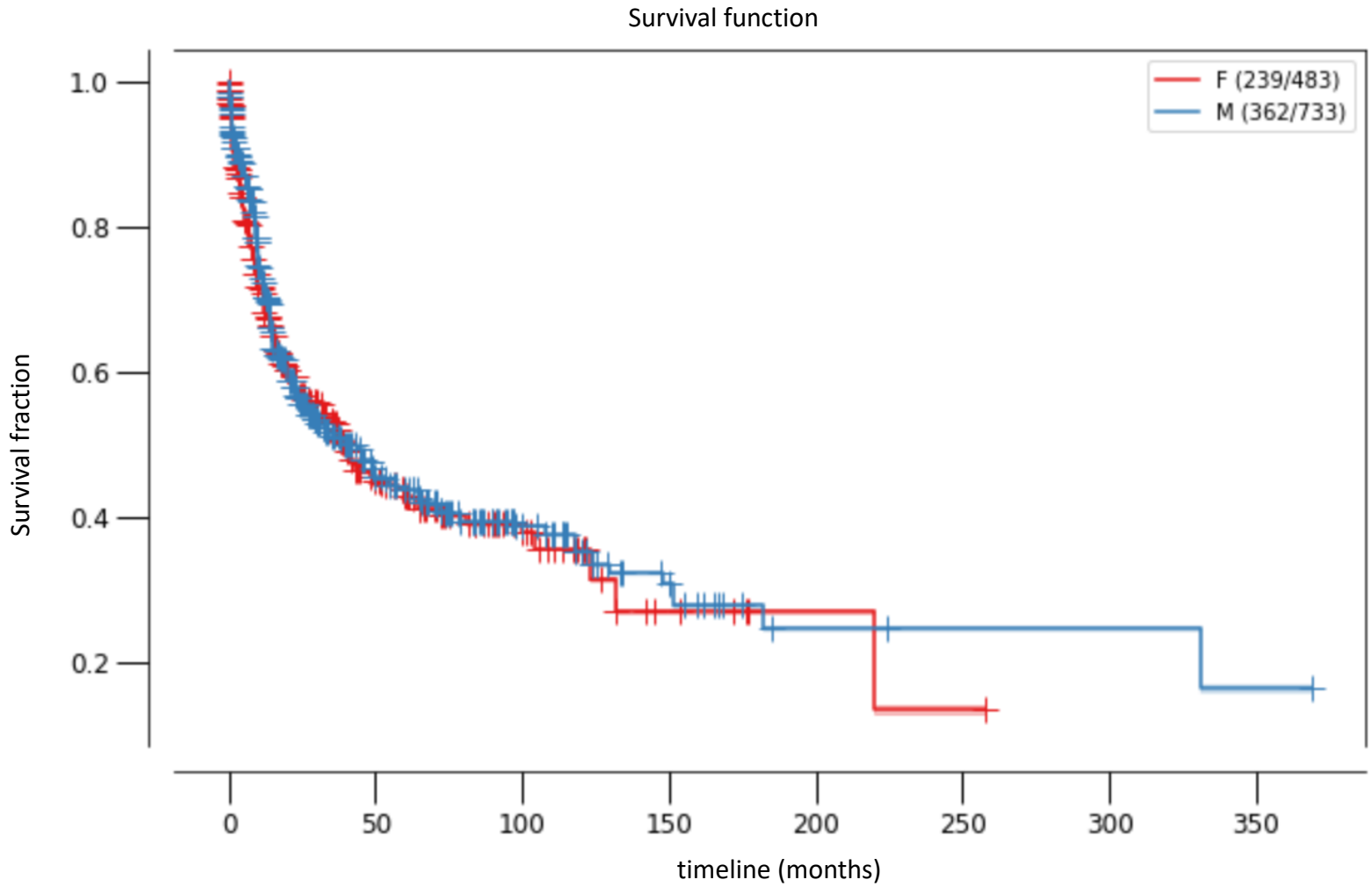
- ERBB2(+) : 17q12
- TP53(-) : 17p13.1
- MYC(+) : 8q24.21
- CDKN2A(-) : 9p21.3



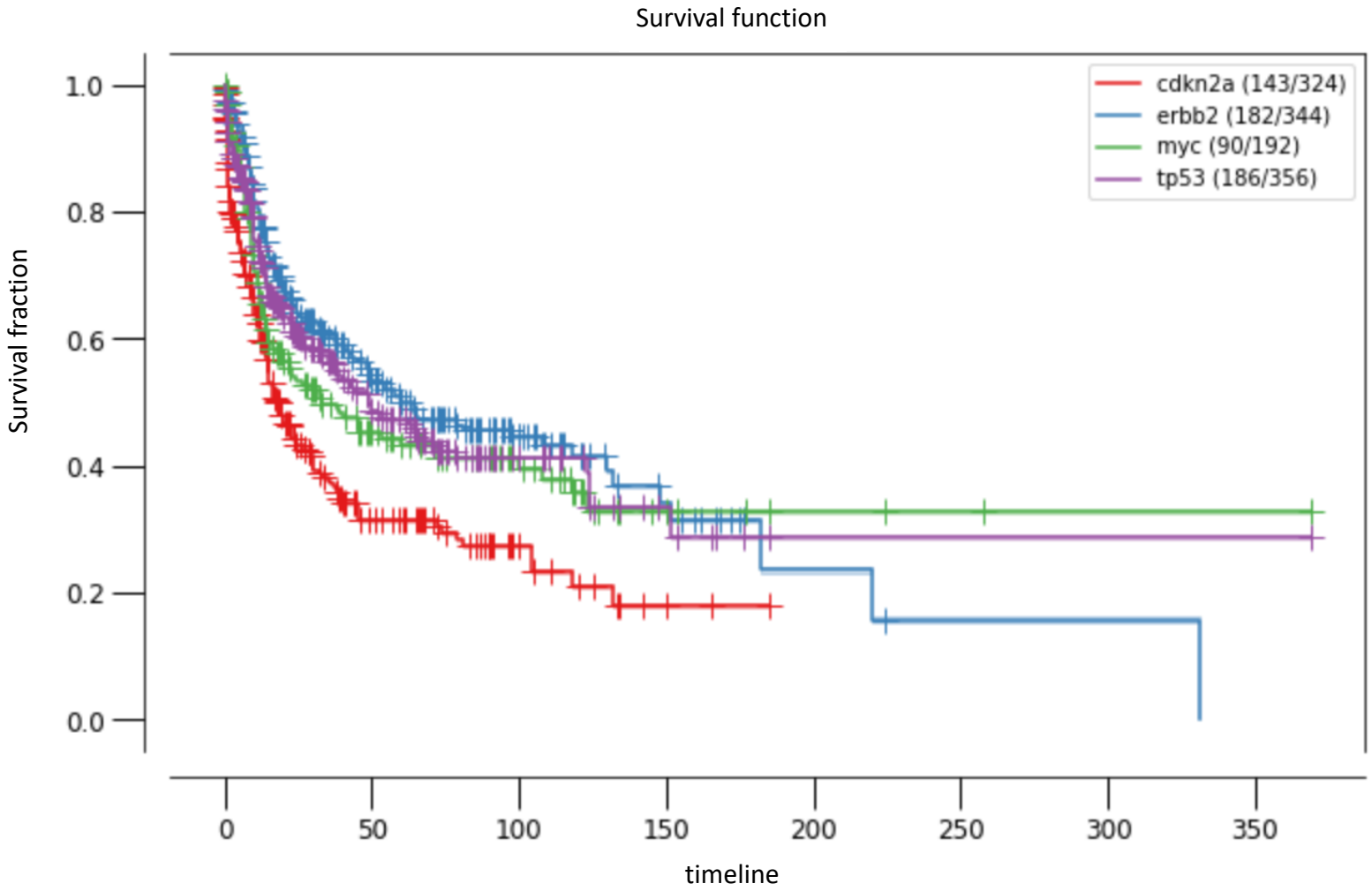
Kaplan Meier: Survival based on Tumor Type



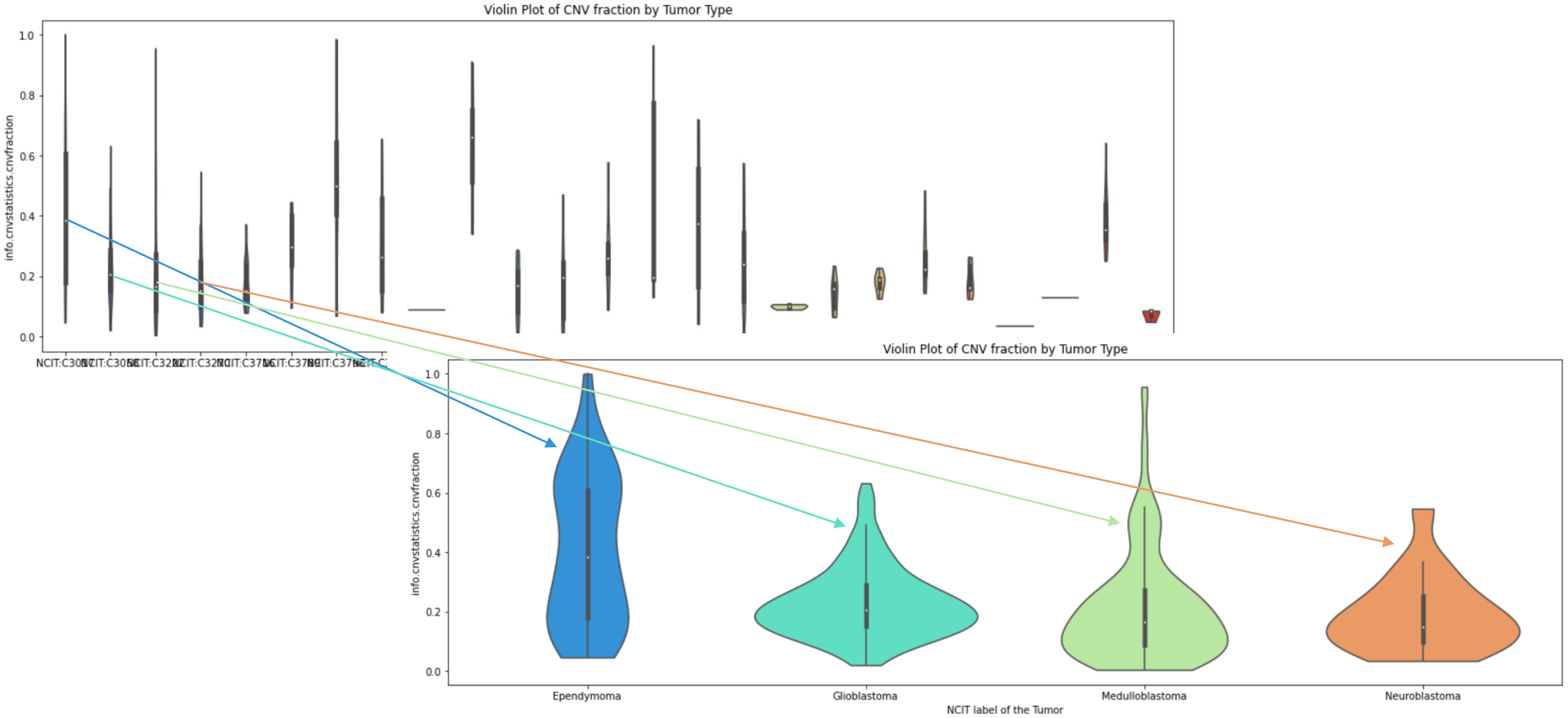
Kaplan Meier Plot: Survival based on sex



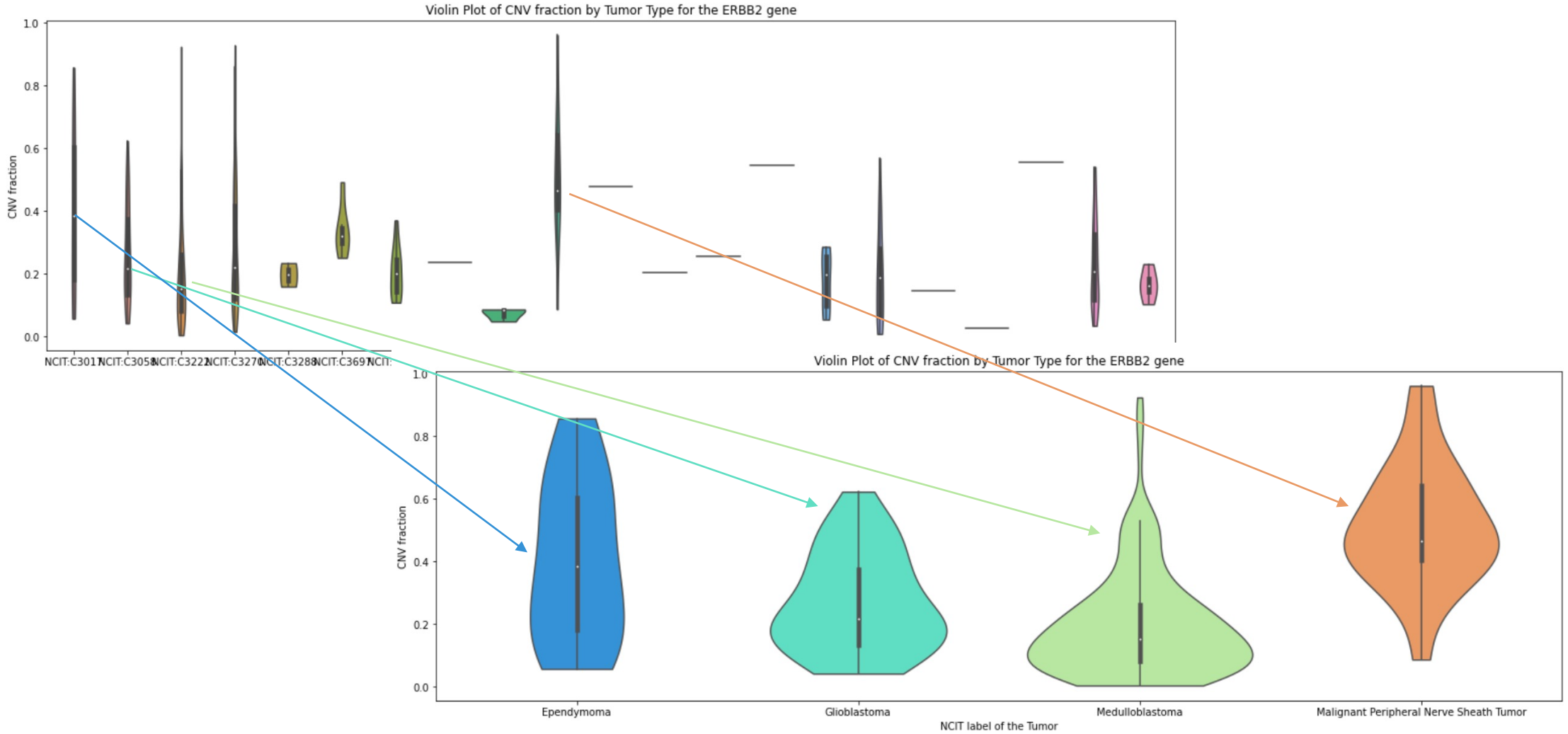
Kaplan Meier Plot: Survival based on gene



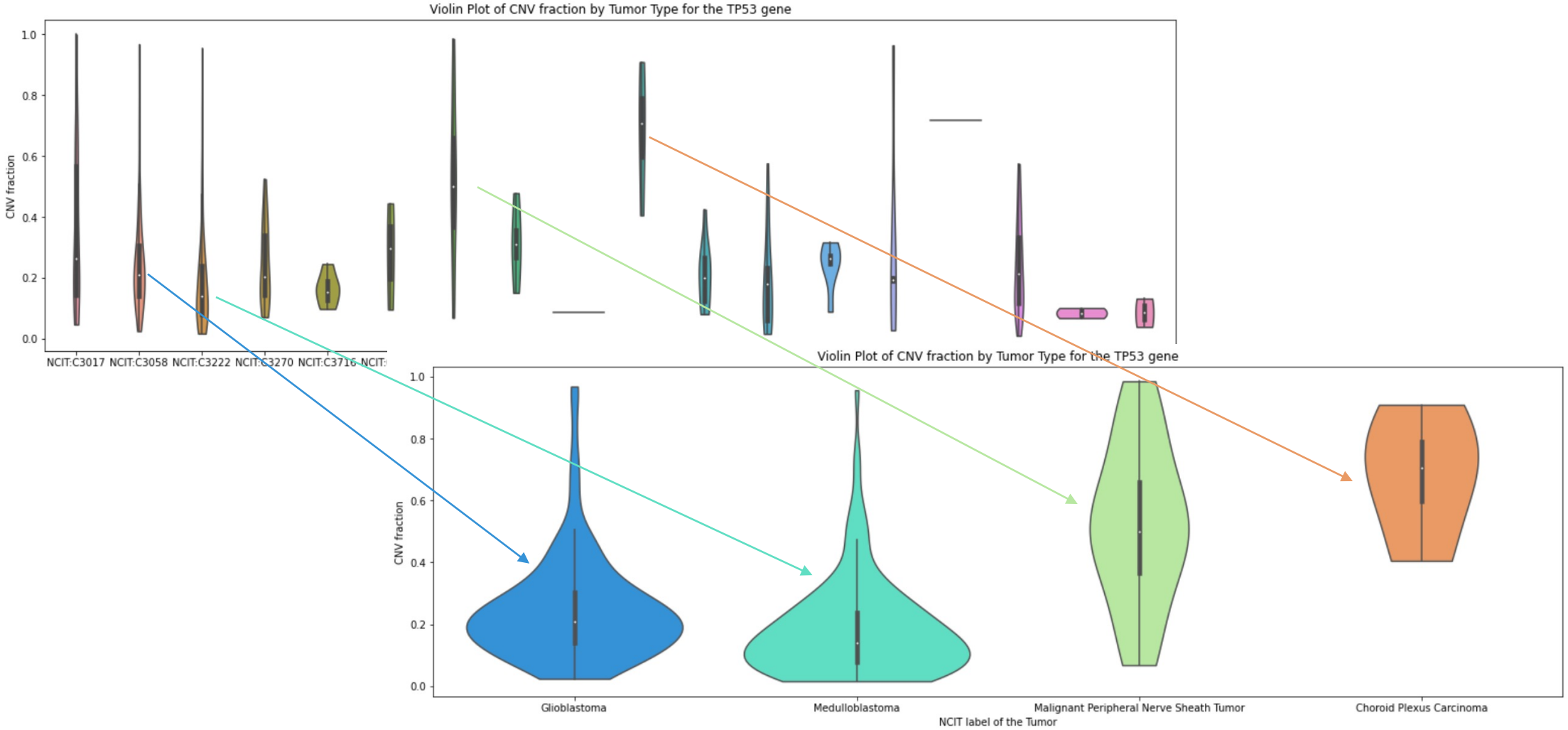
Violin Plot of CNV fraction by Tumor Type



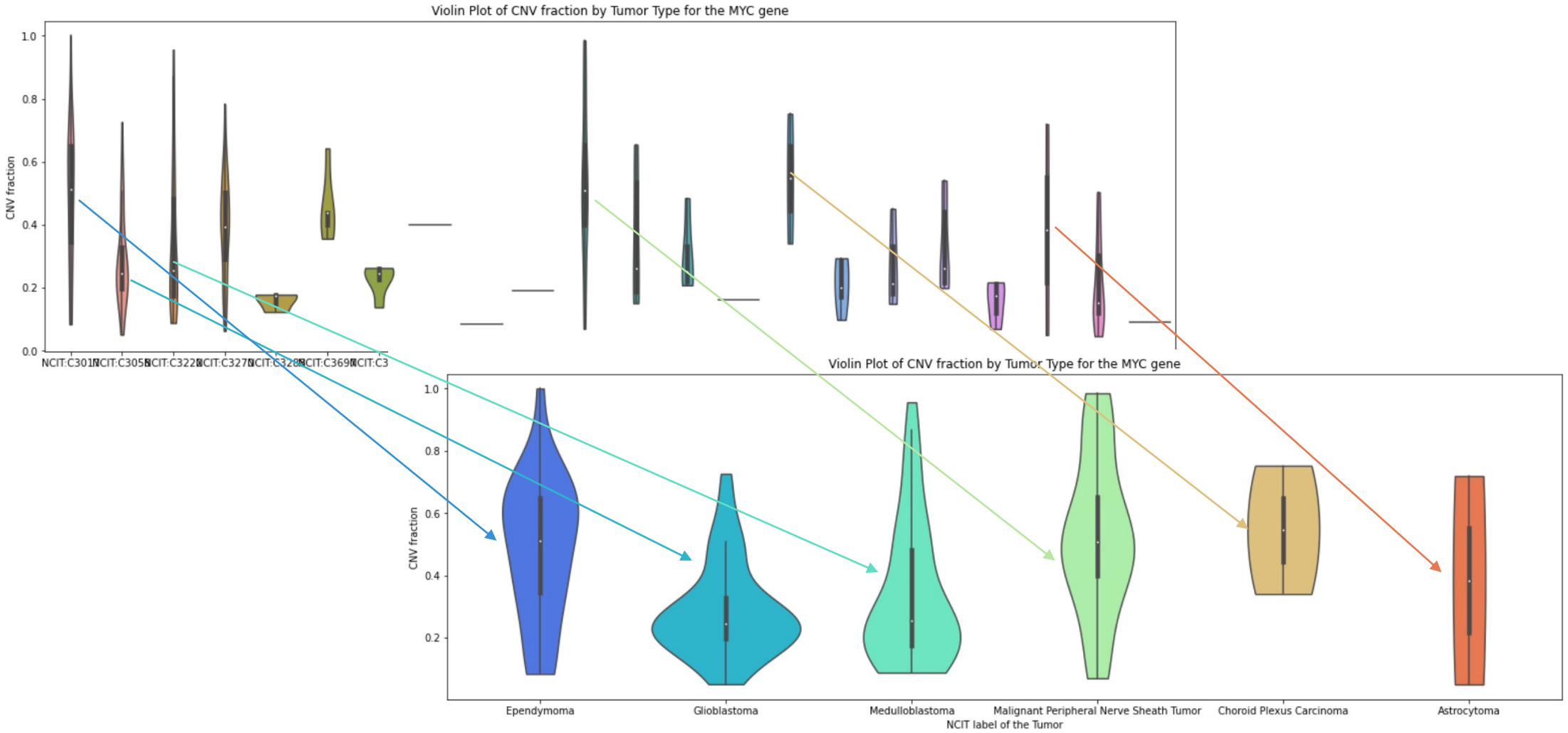
CNV fraction by Tumor Type **ERBB2**



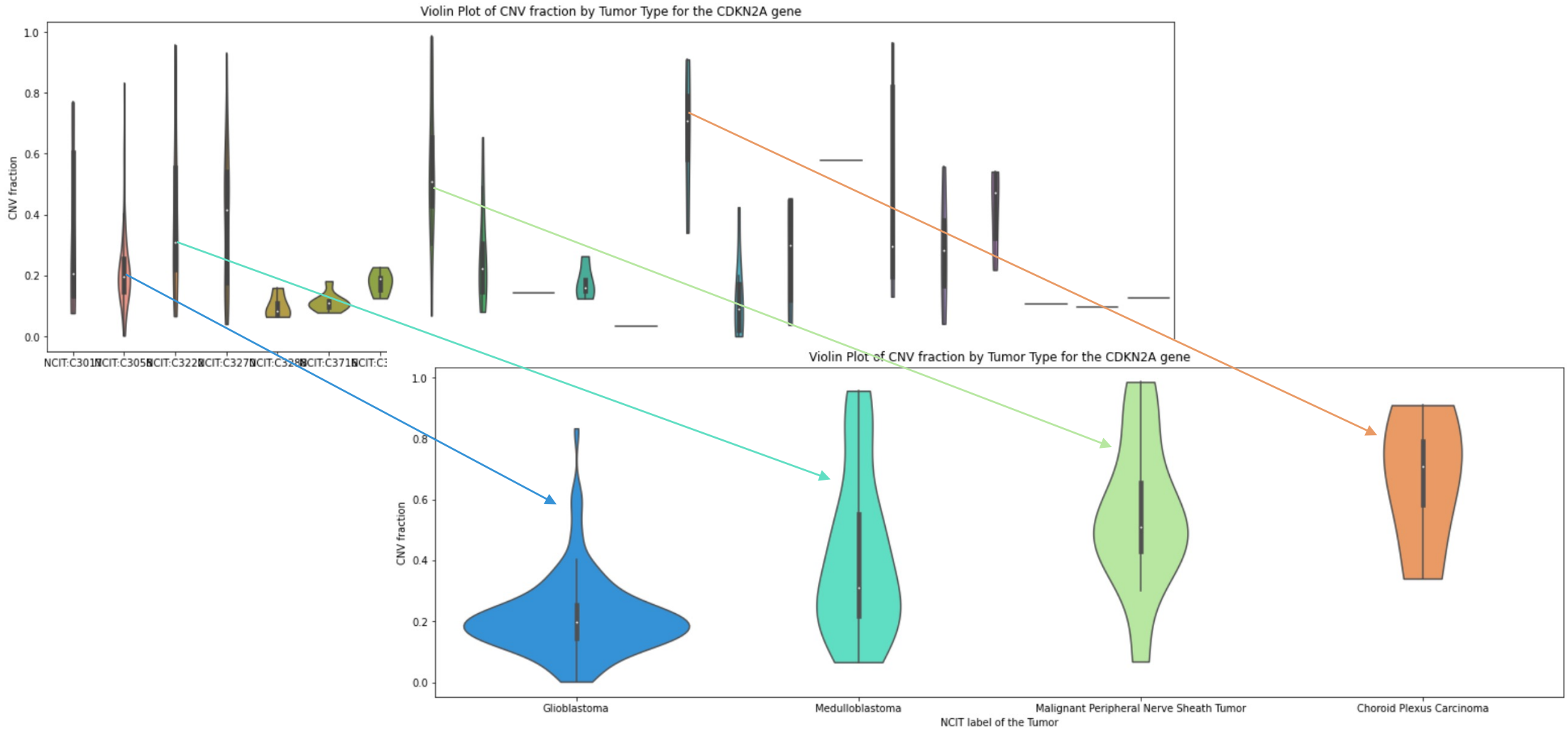
CNV fraction by Tumor Type **TP53**



CNV fraction by Tumor Type **MYC**



CNV fraction by Tumor Type **CDKN2A**



Conclusion

Sources

- https://utswmed.org/conditions-treatments/nervous-system-tumors/
- http://progenetix.org/cgi/PGX/cgi/collationPlots.cgi?datasetIds=progenetix&id=NCIT:C3268
- https://www.mayoclinic.org/diseases-conditions/glioblastoma/cdc-20350148
- https://www.mayoclinic.org/diseases-conditions/medulloblastoma/cdc-20363524
- https://academic.oup.com/jnen/article/61/3/215/2609899?login=false
- https://www.aaroncohen-gadol.com/patients/glioma/glioma-what-the-patient-needs-to-know
- Molecular Pathology of Nervous System Tumors Biological Stratification and Targeted Therapies (Matthias A. Karajannis, David Zagzag ,2015)